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§ 185. **Cleistogene—Flowers**—*The cleistogene flowers* of Viola cucullata are greatly deformed and yet very efficient. Their every ovule is impregnated, and their capsule full of seeds. The flower is closely inflected on its stalk, conical in shape, having only its pale green calyx to cover it, which it does closely, never opening until forced open by the growth of its ovary. The anthers are in close contact with the stigma and open towards it, discharging on it *all* their pollen : at least, while the pollen is plainly seen under the stigma suspended by its tubes, I could find none in the anther cells.

The average number of seeds in these capsules is 60, and the grains of pollen in each anther are certainly few, if any, more than 12. Here then is the economy of cleistogene flowers. They dispense with nectar, with superfluous pollen, and with the flaunting corolla, and yet, by husbanding all their pollen, secure a better crop even than the open vernal flowers.

Are the flowers of *Gentiana Andrewsii* properly cleistogene? They afford now an interesting study in connection with the question of insect agencies in fertilization. On the 19th of September I examined numerous specimens in all stages of advancement. In every flower *save one* the corolla was completely and *doubly* closed, as usual, by the interpetalary appendages in contorted folds, which are again covered by the true petals. The appendages are 2-lobed and in our specimens not at all fringed, as sometimes described. The 5 anthers, slightly cohering, closely encircle the short style just beneath and in actual contact with the 2 recoiled stigmas. After impregnation, the stigmas, by the growing ovary, are carried far above the anthers.

In every flower whose anthers were open pollen was found on the stigmas, but not scattered on other parts ; all that was not on the stigmas apparently remained yet in the anthers. This was the case even with that flower whose corolla was open by a small round aperture.

The grains are very small—four times smaller than those of the Morning-Glory. I estimated their number to be about 400 in each anther—2,000 in the 5 anthers. I also estimated the number of ovules in the ovary and seeds in the capsule, and found them to be 1000 (in some a little more, in others a little less.)

Nectar abounds in this as in other flowers, secreted in the depths of the corolla tube.

From these observations I infer that the flowers of the closed Gentian are properly *cleistogene;* that insects have little or nothing to do in their fertilization. Of the 50 flowers examined both at night and morning, only one was opened (as if by an accident). None showed signs of disturbance of pollen previous to impregnation. In some of the half-grown capsules worms were found, having eaten their way in. The plant is doubtless completely self-fertilized. The nectar goes untasted, serving some other purpose than a bait for bees. The pollen is not wasted, and there is none or little to spare, being only 2 grains to each ovule.

§ 186. **Cereus serpentinus,** Lag.—A few days ago I was much surprised to see one of my night-flowering Cerei, perfect its bloom in the early hours of the day, Sept. 3d, instead of late in the evening, as is the habit of this plant. *Cereus serpentinus* (Lagasca), or Serpent-like Cereus, had been kept out of doors since August 10th. Previous to that time it stood under glass, where its buds were set. On the night of the 24th three buds opened simultaneously; another bloomed in the evening of the second day afterwards, and another still shed radiance between the hours of 8 and 12 P.M., of August 22d.

The temperature of Sunday, Sept. 2d, was decidedly autumn-like, being the first cool weather of the season. At 6 P.M. of that day the bud looked as if it might expand on the following evening. It had not yet the plump appearance of a mature bud. During the night it blew up cold, the thermometer at midnight indicated 63°; at 7 A. M. of the following day it stood at 60°, and it is fair to suppose that at 3 o'clock A. M., the time of expansion of this wonderful bud, the mercury indicated about 55 degrees Farenheit. While the temperature of August 29th, at 3 P.M., indicated 90°, that of September 2d, at the same hour, was only 75°. To this sudden decrease of temperature may be due the fact that the natural development of the bud was much delayed, in fact arrested, by a cold wave, so that the flower, which, all conditions being equal, should have opened on the evening of the 2d, did not expand until about 3 o'clock the following morning.

From 6.30 to 8.30 A.M., the flower, which was nearly all white, seemed to be at its zenith of beauty. I had the plant photographed at 9 o'clock. It commenced to contract about 10 A.M., and by 12 o'clock it was almost closed. The time of inflorescence of this species certainly does not last more than 8 or 9 hours. Having repeatedly taken notes of its period of flowering, I know it to be so. *Anthesis* or the opening of the bud is perfected in about an hour's time.

There is a well defined periodicity in the flowering of all plants. In this case it was exceptional, the thermometrical variation producing a decided change in the development of the flower-bud.

606 3d AVE., *Sept. 7th.* R. E. KUNZÉ, M.D.

§ 187. **Florida Ferns.**—During the first two weeks in May, accompanied by two or three friends, I went on a botanizing expedition in a cart. This two-wheeled Florida cart proved to be a very convenient vehicle in going into difficult roads and hard places. Our destination was the Halifax River, the "Settlements," Daytona and Port Orange, about 60 or 70 miles south of St. Augustine. I found *Polypodium Plumula*, Willd., growing equally well on decaying, prostrate logs, and in the ground on the bank of a constant brook at Daytona, and once on the trunk of a living tree, a foot or two above the base. This last was a fine, large specimen, well fruited. The fern was most plentiful by the side of the brook. I had never before had fruited specimens of it, except one frond that seeded in my fernery. I had collected the fern about fourteen miles west of St. Augustine, in deep woods, where it grew upon two or three inclined Live-Oak trees, climbing the trunks as *P. incanum* does, and, like it, curled up tight in dry weather. The specimens that I saw there were not more than eight or ten inches high, and the pinnae very